

**NEMATUS OLIGOSPILUS FÖRSTER (HYMENOPTERA: TENTHREDINIDAE),
AN INTRODUCED WILLOW SAWFLY IN THE SOUTHERN HEMISPHERE**

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Abstract.—*Nematus oligospilus* Förster is an adventive sawfly in Argentina, Chile, South Africa, Lesotho, and New Zealand where it is destructive to willows and poplars. The species is redescribed from types from Europe and compared with the Southern Hemisphere specimens. A lectotype is designated. *Nematus desantisi* Smith, described from Argentina, is a **new synonym** of *Nematus oligospilus*. Recorded hosts and distribution in the Southern Hemisphere are given.

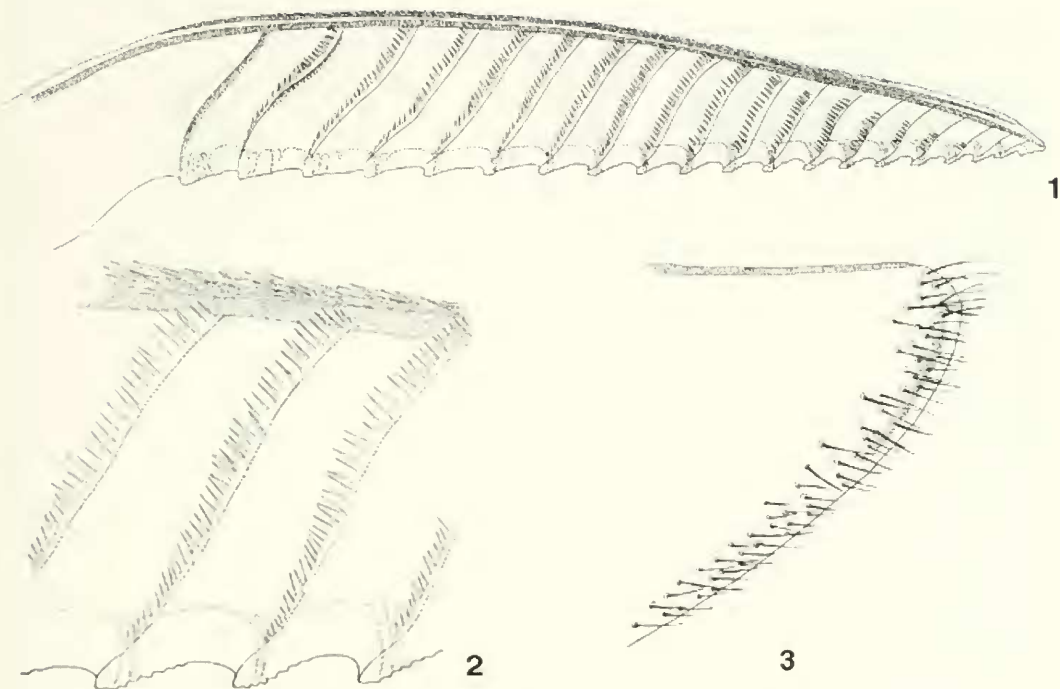
Key Words: willow, poplar, *Salix*, *Populus*, Argentina, Chile, South Africa, Lesotho, New Zealand

A species of *Nematus* Panzer destructive to willows and poplars has appeared in five widely separated countries in the Southern Hemisphere in the past 20 years. These introductions are in Argentina, Chile, South Africa, Lesotho, and New Zealand. Willows and poplars are important in these areas because they are used as shelterbelt plants, for provision of shade and browsing areas for stock, for river and streambank protection, for hill country erosion control, for firewood, and for ornamentation. Thus, the sawfly is of great concern, and its correct identity is essential to determine possible types of control efforts and facilitate search for appropriate natural enemies.

The sawfly was first discovered in Argentina about 1980 (DeSantis 1981, Smith 1983). It appeared to be close to the traditional concept of *Nematus oligospilus* Förster which, as currently interpreted, is a common willow-feeding sawfly in the Holarctic Region. However, because taxonomic

difficulties of the green *Nematus* species have not been resolved and because it differed from some northern populations in some minor characters, Smith (1983) described it as *Nematus desantisi*. The species eventually spread north and west in Argentina and into Chile. In all South American literature, this species is called *Nematus desantisi* Smith. In the early 1990's, a species of *Nematus* was discovered in southern Africa (Urban and Eardley 1995). This was identified as *Nematus oligospilus* by the senior author. Several years ago, the same species was discovered in New Zealand (Berry 1997, personal communication). The specimens from introductions into all three regions are similar and determined by us to be conspecific.

No species of *Nematus* are endemic in the Southern Hemisphere. The only endemic species of Nematinae are a few species of *Pristiphora* Latreille recorded as far south as southern Brazil (Santa Catarina)



Figs. 1-3. *Nematus oligospilus*. 1. Female lancet, entire. 2. Central serrulae of lancet. 3. Female sheath. Illustrations by FK.

(Wong and Benson 1965). In order to clarify the identity of the introduced *Nematus* species, the senior author located and studied Förster's types of *Nematus oligospilus*. Here, we confirm the identity of this introduced species in all regions of the Southern Hemisphere as *Nematus oligospilus*, propose the synonymy of *Nematus desantisi* Smith, describe and illustrate the species, and give the current distribution and recorded hosts for this species in the Southern Hemisphere. As currently interpreted, in the broad sense, *Nematus oligospilus* is a widespread willow-feeding sawfly in the Holarctic Region. However, it is possibly a complex of closely related species, and the solution to this problem is beyond the scope of this paper.

Nematus oligospilus Förster
(Figs. 1-8)

Nematus oligospilus Förster 1854: 284. Female. Type locality: Aachen, Germany.
Nematus desantisi Smith 1983: 260. Fe-

male. Type locality: Chubut, Argentina.
New synonymy.

Female.—Length, 5.2–7.0 mm. Green when alive; dry specimens faded yellow. Antenna pale yellow; scape and pedicel black; upper surface of flagellum brown. Head with black spot posterior to postocellar area, interocellar area and spot on frontal area black. Mandible apex reddish brown. Mesoscutum with three black stripes. Spot on posterior margin of perapsits black, medial part of mesopostnotum black, metapostnotum with black medial spot. Terga 1–3 with black medial spots, apical margin of sheath narrowly black. Wings hyaline; costa and stigma yellow (green when alive); remaining veins brownish.

Head and thorax shining, with duller microsculpture at middle of vertex and frons. Hairs white and shorter than diameter of an ocellus. Head in dorsal view parallel-sided behind eyes. Antennal length $3.1 \times$ as long as maximum head width; scape as long as

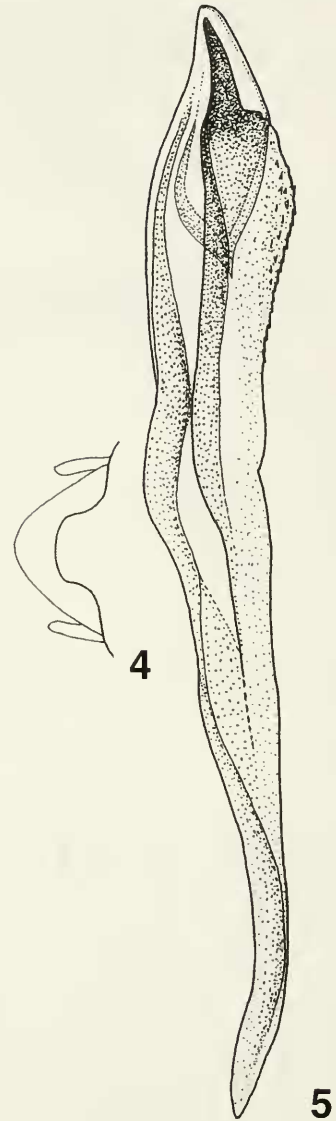
broad; pedicel broader than long; 3rd segment slightly shorter than 4th segment; 4th segment clearly longer than 5th segment; segments 5–9 gradually decreasing in length. Distance between hind ocelli equal to distance from hind ocellus to eye. Inner margins of eyes subparallel, slightly diverging below; lower interocular distance $1.8 \times$ eye length, upper interocular distance $1.7 \times$ eye length. Postocellar area width:length = 2.3:1.0. Clypeus circularly emarginated at center for $0.4 \times$ its medial length, with rounded lateral teeth. Malar space $1.4 \times$ diameter of an ocellus. Interantennal foveae rounded, slightly more than diameter of an ocellus; frontal crest of frontal area shallowly broken in middle. Sheath and lancet as in Figs. 1–3.

Male.—Length, 4.7–5.3 mm. Coloration similar to that of female except postocellar area, occiput behind, and frontal area totally black. Mesonotum except notauli black, metascutellum and metapostnotum black, propleuron and dorsal part of mesepimeron brownish. Upper surfaces of tarsi entirely brown. Abdomen with a broad, black, longitudinal dorsal stripe.

Sculpture of head and thorax similar to those of female. Head in dorsal view subparallel behind eyes, slightly narrowing. Antennal length $3.4 \times$ head width; 4th segment hardly longer than 5th segment. Apex of 8th tergite and penis valve as in Figs. 4–5.

Types.—Two specimens regarded as Förster's types of *N. oligospilus* are in the Zoologische Staatssammlung, München, Germany. The lectotype, here designated, is a female labeled: "Cotype" (red); "*Nematus oligospilus* FORST. f, A. Förster det."; "Sammlung A. Förster"; "*Pteronidea oligospila* FORST. f, Konow det."; "Lectotypus, des.: F. Koch, 1998" (red); "*Nematus oligospilus* Förster f, det.: F. Koch '98." A paralectotype female is labeled like the lectotype except for Koch's lectotype label.

The holotype female of *Nematus desantisi* Smith is labeled: "Valle del Rio Chubut, Chubut, Argentina, host *Salix* spp.,



Figs. 4–5. *Nematus oligospilus*. 4, Male hypopygium. 5, Penis valve, lateral view. Illustrations by FK.

16.II.1981"; 22 paratype females have the same labels as the holotype. The holotype and 12 paratypes are in the Universidad Nacional de La Plata, Argentina; 10 paratypes are in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Distribution.—Endemic to north and central Europe, Caucasus (Muche 1974).

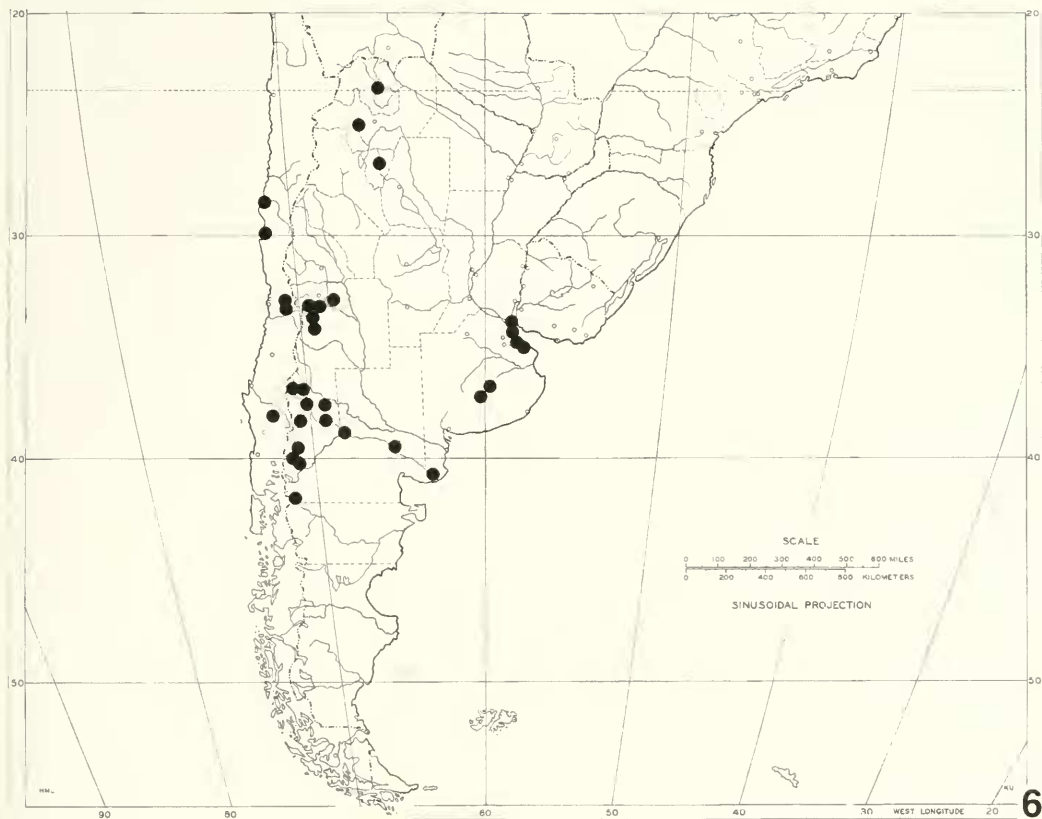


Fig. 6. Distribution of *Nematus oligospilus* in South America. Each province of occurrence is represented but not necessarily representative of all localities in each province.

Introduced into Argentina, Chile, Lesotho, South Africa, and New Zealand. Recorded from North America and Eurasia, but identity of specimens from these areas needs confirmation.

Records from the Southern Hemisphere are as follows:

ARGENTINA (Fig. 6): Provinces are listed; specific localities may be found in the references. Buenos Aires (Teodoroff 1983?, DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); Catamarca (Vattuone 1989, Ovruski and Smith 1993); Chubut (DeSantis 1981, Teodoroff 1983, Smith 1983, DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); "Delta del Paraná" (Toscani 1992, Carbacos 1995a, b, c, d); Entre Ríos (see under "Delta del Paraná," probably encompasses part of prov-

ince); Jujuy (Quintana de Quinteros et al. 1991, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); Mendoza (DeSantis and Sureda 1984, Mallea et al. 1985, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); Neuquén (DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Dapoto and Giganti 1992, 1994, Ovruski and Smith 1993); Río Negro (DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Dapoto and Giganti 1992, 1994, Ovruski and Smith 1993); Salta (Ovruski and Fidalgo 1991, Ovruski and Smith 1993); San Juan (DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); San Luis (DeSantis and Sureda 1984, Ovruski and Fidalgo 1991, Ovruski and Smith 1993); Tucumán (Costilla et al. 1990, Ovruski and Fidalgo 1991, Ovruski and Smith 1993, Ovruski 1993).

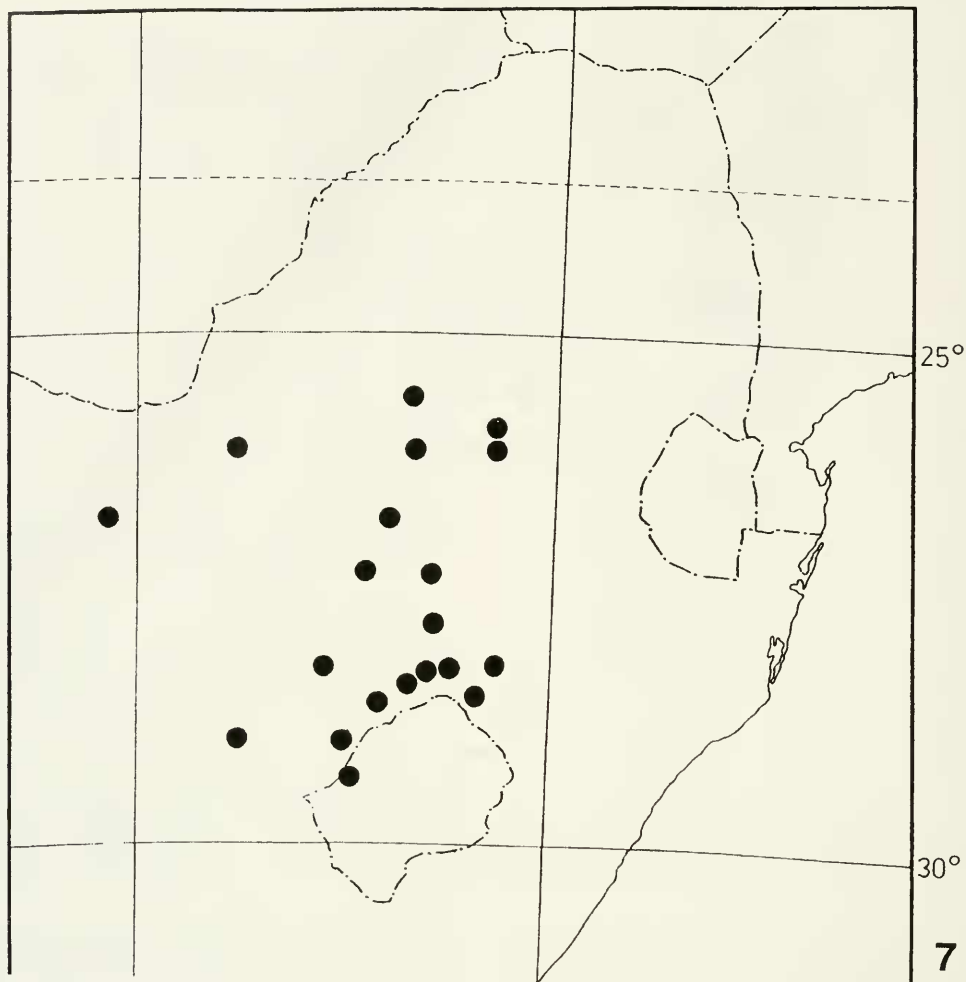


Fig. 7. Distribution of *Nematus oligospilus* in Africa.

CHILE (Fig. 6): From IV Region to IX Region (González 1986, 1989, González et al. 1986).

SOUTH AFRICA (Fig. 7): (Urban and Eardley 1995, 1997).

LESOTHO (Fig. 7): (Urban and Eardley 1995, 1997).

NEW ZEALAND (Fig. 8): (Berry 1997, van Kraayenoord 1997).

Biology.—Biological and life history notes are given by DeSantis and Sureda (1984), Teodoroff (1983), Mallea et al. (1985), Gonzáles (1986, 1989), Gonzáles et al. (1986), Giganti and Dapoto (1990), Dapoto and Giganti (1992, 1994), Ovruski and

Fidalgo (1992), Ovruski (1993), DeSantis (1994), Cabarcos (1995 a, b, c, d), Urban and Eardley (1995), Berry (1997), and van Kraayenoord (1997). Many of the references also contain information on parasitoids and other natural enemies.

Host plants.—Those recorded in Europe and the Southern Hemisphere are given in Table 1.

Discussion.—Identification of the green *Nematus* species is very difficult because the species are very similar and many species have been described (Lindqvist 1962). A revision is necessary, and all types must eventually be investigated. In many cases,

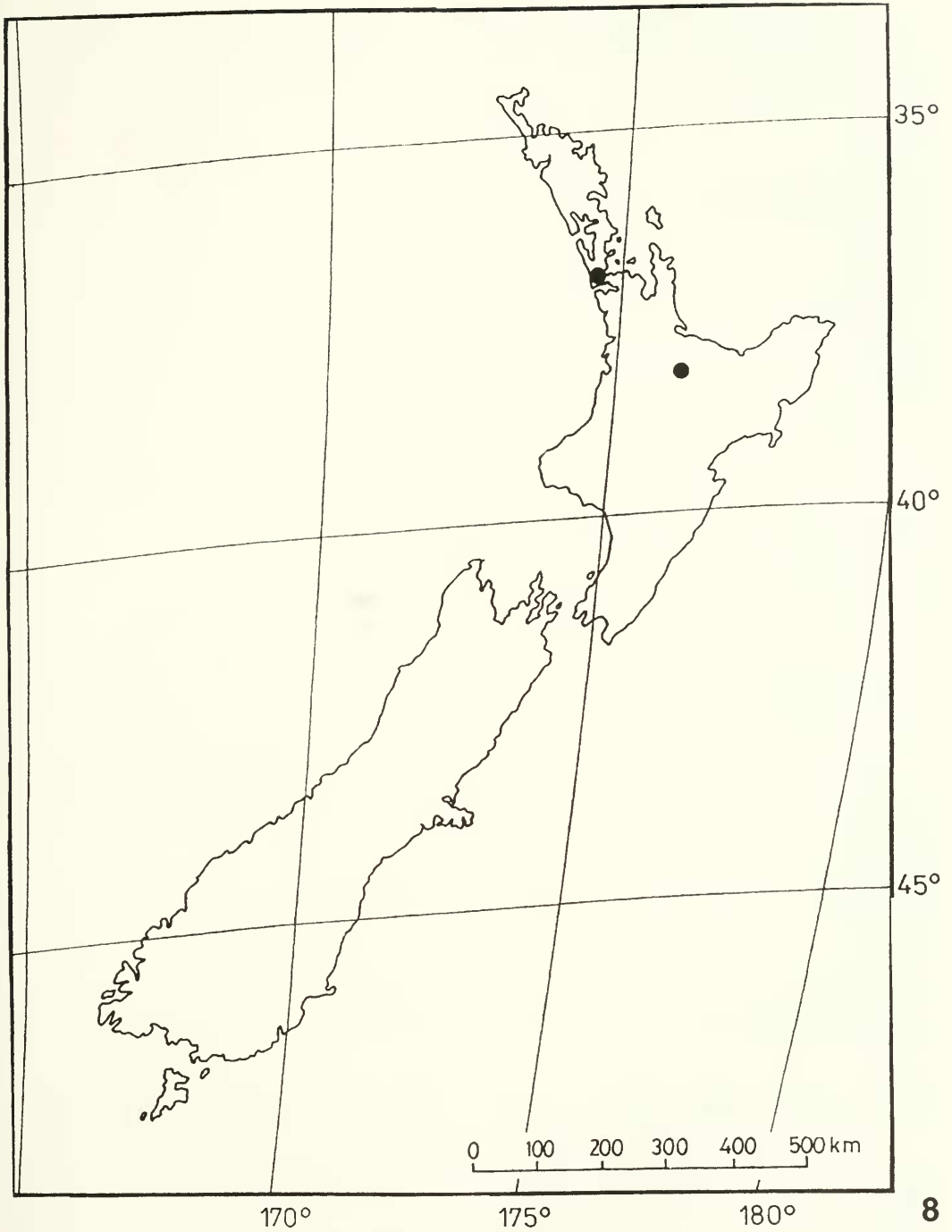


Fig. 8. Distribution of *Nematus oligospilus* in New Zealand.

Table 1. Host plants recorded for *Nematus oligospilus*.

Country: Host Plant	Reference
Europe	
<i>Salix</i> sp.	Muche (1974)
New Zealand	
<i>Salix humboldtiana</i> Willd.	Berry (1997)
<i>Salix matsudana</i> Koidz.	Berry (1997)
<i>Salix</i> sp.	van Kraayenoord (1997)
South Africa	
<i>Salix babylonica</i> L.	Urban and Eardley (1995, 1997)
<i>Salix fragilis</i> L.	Urban and Eardley (1995, 1997)
Lesotho	
<i>Salix babylonica</i> L.	Urban and Eardley (1995, 1997)
Argentina	
<i>Salix alba</i> L.	Dapoto and Giganti (1992)
<i>Salix babylonica</i> L.	DeSantis and Sureda (1984); Dapoto and Giganti (1992, 1994); Carbacos (1995d)
<i>Salix caprea</i> L.	Teodoroff (1983); DeSantis and Sureda (1984)
<i>Salix elegantissima</i> K. Koch	Dapoto and Giganti (1992, 1994)
<i>Salix erythroflexuosa</i> Rag. R.	Mallea et al. (1985)
<i>Salix fragilis</i> L.	Dapoto and Giganti (1992, 1994)
<i>Salix humboldtiana</i> Willd.	Smith (1983); DeSantis and Sureda (1984); Mallea et al. (1985); Quintana de Quinteros et al. (1991); Dapoto and Giganti (1992)
<i>Salix matsudiana</i> Koidz.	Dapoto and Giganti (1992)
<i>Salix nigra</i> Marsh.	DeSantis and Sureda (1984); Toscani (1992); Carbacos (1995c, d)
<i>Salix</i> spp.	Vattuone (1989); Costilla et al. (1990); Giganti and Dapoto (1990); Ovruski and Fidalgo (1991); Ovruski (1993); Ovruski and Smith (1993); Carbacos (1995a, b, c)
<i>Populus alba</i> L.	Mallea et al. (1985); Dapoto and Giganti (1992, 1994)
<i>Populus</i> × <i>canadensis</i> Moench.	Dapoto and Giganti (1992, 1994)
<i>Populus nigra</i> L.	Mallea et al. (1985)
<i>Populus</i> spp.	Teodoroff (1983); DeSantis and Sureda (1984); Ovruski and Fidalgo (1991); Ovruski (1993); Ovruski and Smith (1993)
Chile	
<i>Salix babylonica</i> L.	González (1986, 1989); González et al. (1986)
<i>Salix humboldtiana</i> Willd.	González (1986, 1989); González et al. (1986)

series of syntypes include different species. Another problem is the association of sexes.

In the collection of the Zoologische Staatssammlung München there are 11 females and 30 males of *Nematus oligospilus* which Zirngiebl (label data) bred through several generations. These specimens are determined to be the same species as Förster described, and the series associates the sexes. The coloration of the sexes is different, as described above. The description of

the male given here is from the European specimens since males have not been taken in the introduced populations. For identification of males, it is possible to compare descriptions by Enslin (1916), Benson (1958), Lindqvist (1962), and Muche (1974). Their illustrations of the penis valve and their descriptions of the species are more or less similar, but it is difficult to determine if they are all the same species. Since no other species of *Nematus* are

known from the Southern Hemisphere, a case of mistaken identity is virtually impossible if males are found. They would almost certainly be that of *Nematus oligospilus*.

Nematus oligospilus in the Southern Hemisphere, unlike populations in the Northern Hemisphere, produce only females (thelytokous parthenogenesis). This reproductive strategy promotes the rapid spread of the species over a wide area. Further, the cultivation of willows and poplars in large monocultures certainly aids in their dispersal. The climatological factors in each country are also very advantageous, and up to four generations per year are possible.

Variation is found in the black pattern of the body. In the paralectotype, the black spot behind the postocellar area is larger than in the lectotype and there is a narrow stripe in the center of the postocellar area. Also, the black markings of the interocellar area and frontal area are more expanded in the paralectotype.

In the African specimens, the black on the head and the mesoscutum is missing, but the parapsites, mesopostnotum, and metapostnotum are always black. However, sometimes small black spots on the lateral lobes of the mesoscutum are present. In rare examples, the posterior margin of the mesoscutellum and the entire metascutellum are black. The markings on the tergites are like the European material.

Most of the South American specimens, including the type series of *Nematus desantisi*, are all faded yellow, with only the center of the mesopostnotum, the metapostnotum, and the parapsites black, but some specimens are patterned like the African specimens.

In the New Zealand specimens, the black pattern is mostly reduced. Only the meso- and metapostnotum are patterned with black. Sometimes a small spot on the parapsites is developed.

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